Supplemental Specification
2005 Standard Specification Book

SECTION 13553

ATMS CONDUIT

Delete Section 13553 and replace with the following:

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Materials and procedures for installing conduit as specified in the contract. Unless otherwise specified, install conduit by trenching, boring, or plowing.

B. Detectable pull tape and all materials, labor, workmanship, equipment, and incidental items required for a complete system of conduit.

1.2 RELATED SECTIONS

A. Section 00725: Scope of Work

B. Section 01721: Survey

C. Section 02061: Select Aggregate

D. Section 02324: Compaction

E. Section 02705: Pavement Cutting

F. Section 02741: Hot Mix Asphalt (HMA)

G. Section 02776: Concrete Sidewalk, Median Filler, and Flatwork

H. Section 02892: Traffic Signal

I. Section 03575: Flowable Fill

J. Section 13554: Polymer Concrete Junction Box

1.3 REFERENCES

A. ASTM D 2241: Standard Specification for Poly-Vinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)

B. American National Standards Institute (ANSI)

C. National Electrical Code (NEC)

D. National Electrical Manufacturers Association (NEMA)

E. Railroad Specifications

F Underwriters Laboratory (UL)

PART 2 PRODUCTS

2.1 MATERIALS

A. Conduit and Fittings:
   1. Schedule 40 PVC rated at 194 degrees F, as specified. NEMA TC-2, NEMA TC-3, ASTM D 2241, UL Listed
   2. HDPE (High Density Polyethylene) SDR11 rated, as specified. ASTM D 2241
   3. Rigid steel as specified (UL-6)
   4. Galvanized as specified (ANSI C80.1)

B. Non-Metallic Conduit
   1. New, prefabricated.
   2. ATMS Multi-duct Conduit Types
      a. 1D = four 2-inch conduits
      b. 2D = eight 2-inch conduits
      c. 4D = sixteen 2-inch conduits
   3. Color-code each conduit or cell as follows:
      a. One, two or three conduits: gray
      b. 1D
         Bank 1: blue, orange, green and brown
      c. 2D
         Bank 1: blue, orange, green, and brown
         Bank 2: slate, white, red, and black

d. 4D
Bank 1: blue, orange, green, and brown
Bank 2: slate, white, red, and black
Bank 3: same as bank 1 with a stripe of contrasting color
Bank 4: same as bank 2 with a stripe of contrasting color

C. Meet or exceed all of the conduit manufacturer's recommendations for all materials used in the installation of conduits, such as sweeps, adapters, couplings, glue, plugs, and fittings. Conduit plugs must seal the conduit and allow the secure fastening of detectable pull tape.

D. PVC conduit sections: nominal 20 ft sections; couplings and fittings to provide for watertight integrity.

E. Sweeps: conduit manufactured sweeps (11¼, 22½, 45, and 90 degree angles) complete with bell and spigot.

F. Pull Tape: flat profile, low stretch polyester, detectable, sequential footage marked, 1,200 lb tensile strength pull tape in each empty conduit.

G. Fiber optic and electrical buried cable marker warning tape:
1. Material: Composite reinforced thermoplastic.
2. Tape Color: Orange (communication) or Red (electric).
3. Text: Caution Buried Communication Cable or Caution Buried Electric (front and back).
4. Maximum distance between text: 5 feet.
5. Text Color: Black.
6. Width: 3-inch minimum (face or diameter).

H. Backfill
1. Flowable Fill: Refer to Section 03575.
2. Free Draining Granular Backfill Borrow: Refer to Section 02061.
3. Native material: Compact per Section 02324.

I. Submit all material certifications to the Engineer for approval.

PART 3 EXECUTION

3.1 GENERAL

A. Base final conduit routing on actual field conditions at the time of construction, including Blue Stake markings, to prevent conflicts with existing utilities.

B. Do not place conduit directly above parallel utilities.

C. Obtain appropriate permits before work commences.

D. Record longitudinal and depth GPS coordinates (x,y,z) of conduit according to Section 01721 and show on as-built drawings.

E. Bore conduit when crossing all roadways.

F. Install conduit under park strip where curb and gutter is present.

G. Maximum spacing between junction boxes is as follows:
   1. 1,000 ft for tangent surface street installations
   2. 2,500 ft for tangent highway installations
   3. Reduce maximum spacing if horizontal or vertical deflection prevents the installation of cable within maximum tensile rating of the cable.

H. Conduit under Railroad Right-of-Way: Refer to Section 00725 and appropriate railroad specifications, such as Union Pacific Railroad, Standard Specifications:
   1. Coordinate all work with appropriate Railroad personnel.
   2. Complete Railroad Safety Training.

I. Minimum Cover of Conduit:
   1. Minimum cover in sidewalks or paved surfaces: 3 ft.
   2. Minimum cover in highway right-of-way, greater than 20 ft from the edge of the pavement: 3 ft.
   3. Minimum cover in highway right-of-way, within 20 ft of the edge of the pavement: 5 ft.

J. The Department will not grant additional time or money for installing conduit in difficult subsurface conditions.

K. Obtain approval from the Department on conduit splice connectors before use.

3.2 INSTALLATION

A. Do not allow conduit to deflect vertically or horizontally along its length by a ratio greater than 10:1, (e.g. no more than 4-inch deflection per 40 inch in length) when installing conduit that houses communication cable.

B. Do not allow the sum total of the vertical and horizontal deflection of conduit and bends between any two junction boxes to exceed 270 degrees when installing conduit.

C. Locate conduit within 1 ft of existing parallel conduit run if the planned location of conduit is parallel to the existing traffic signal or ATMS conduit. Refer to Section 02892.

D. Do not field bend conduit. Install all conduit bends to have a radius that is not less than the following:
   1. 24 inches within the cabinet and pole foundations
   2. 36 inches in all other locations

E. Install conduits that cross finished curbs and gutters, sidewalks, concrete flatwork, textured or decorative surfaces by boring, jacking, or drilling. Replace entirely any damaged concrete sections, joint to joint, at no additional cost to the Department.

F. Conduit Stub:
   1. Install conduit in a junction box per Section 13554 to allow for the continuation of a conduit run. Type and number of conduits as specified in the contract.
   2. Extend conduit stub to 10 feet from the junction box in line with the conduit run as specified in the contract.

G. Proof all conduits with an approved mandrel before installation of cabling and detectable pull tape.

H. Provide detectable pull tape in all empty conduits.
   1. Install continuously between junction boxes.
   2. Fasten securely to plug and leave 3 ft of pull tape slack inside of the conduit.
   3. Do not splice detectable pull tape in conduit.

I. Place all conduit that is encased in a structural member per current International Building Code and as approved by the Engineer.

J. Secure conduit on concrete structures with standard galvanized steel conduit clamps using an approved anchoring system.
   1. Install per manufacturer's requirements.
   2. Use waterproof conduit expansion fittings at structure expansion joint crossings.

K. Fill all new and existing conduit to a maximum of 40 percent as per NEC.

L. Encase all open trench conduit in flowable fill. Encase plowed and bored conduit in flowable fill at exposed locations, conduit splice points, and junction box connections.

M. Use galvanized rigid steel conduit for above ground application; use PVC or HDPE conduit for underground application. Apply corrosion protection per NEC Article 346 to any portion of galvanized rigid steel conduit buried in the ground or encased in concrete.

N. Warning Tape:
   1. Install orange warning tape with black legend "Caution - Buried Communication Cable", in all trenches containing multi-duct conduit or conduit containing communication cables.
   2. Install red warning tape with black legend "Caution - Buried Electric" in all other trenches.
   3. Not required when flowable fill is directly overlaid with asphalt pavement or PCCP.
   4. Not required when boring conduit.

O. Install a bushing or adapter at ends of all nonmetallic conduit that contains a conductor per NEC Article 346. Install rounded bushings on the ends of metal conduit per NEC Article 347.

P. Install manufactured sweeps (11¼, 22½, 45, and 90 degree angle) with conduit compatible bell and spigot ends.

3.3 TRENCH

A. Paved Surface (asphalt concrete):
   1. Install T-patch over trenched area according to AT Series Standard Drawings.
   2. Cut pavement from roadway surface to roadway base on both sides of trench to provide a clean, straight wall for T-patch, before any backhoe use per Section 02705.
   3. Refer to AT Series Standard Drawings for depth of flowable fill under paved surfaces.
   4. Compact soil under pavement per Section 02324.

5. Evenly apply tack coat on final backfill before installing T-patch.
6. Restoration patch: match the composition, density, and elevation (±¼ inch), of the existing surface per Section 02741.
7. Apply a hot-pour rubberized asphalt joint sealant or approved equal after the patch is installed.

B. Sidewalk or Decorative Pavement.
1. Use flowable fill to bottom of new pavement.
2. Match existing pavement thickness, but new pavement thickness must be 3½ inches minimum, 8 inches maximum.
3. Compact soil under pavement per Section 02324.
4. Restore sidewalk or decorative pavement to original condition or better after work is completed per Section 02776.

C. Unpaved Surface:
1. Use backfill that matches the composition, density, and elevation (±0.2 inch), of the existing surface per Section 02776.
2. Dispose of surplus material daily.
3. Use flowable fill from bottom of trench to 3 inches above top conduit.

D. Sleeve foreign utilities that cross a trench so they are not encased in flowable fill.

E. Place all conduits in the same trench whenever possible.

F. Flowable fill:
1. Encapsulate conduit at least 3 inches above the top conduit with flowable fill.
2. Continue flowable fill to the wall of the junction box to seal conduit entry into the junction box.
3. Clean excess flowable fill from the inside of the junction box.

G. Install all conduits so the flowable fill completely surrounds all exterior surfaces of the conduit. Separate multi-duct conduits using a commercially available conduit spacer or approved equivalent.

H. Anchor the conduit in trench at 16 ft intervals to maintain the required conduit depth during flowable fill placement.

I. Minimum separation between all conduit and the wall of the trench is 1½ inches.

J. In native earth, do not place flowable fill within 8 inches of the finished grade.

3.4 BORE OR PLOW

A. Install flowable fill per this Section, article 3.3, at all exposed conduit locations.

B. Immediately contain and remove all drilling fluid outside the bore. Contractor's estimate will not be processed until all drilling fluid outside the bore has been removed and properly disposed.

3.5 USE OF EXISTING OR OCCUPIED CONDUIT

A. Maintain the physical condition and functional integrity of all cabling and wiring in existing or occupied conduit.

B. For installation of cable or wire in an existing or occupied conduit:
   1. Remove any existing fiber optic cable or copper wire.
   2. Test the integrity and clean the conduit by successfully pulling a Department approved mandrel through the conduit.
   3. Re-pull existing and new fiber optic cable or copper wire together.
   4. Perform all necessary splices and replace any impacted fiber cable and spider fan-out kits.
   5. Perform all additional work necessary to restore existing cable and conduit systems to original or better condition.

C. Use existing conduit only in-situ and as approved by the Engineer or as specified in the contract.

D. Use new conduit on all new installations.

3.6 REPAIR OR RESTORATION

A. Restore all areas, including landscaping, concrete pavement, asphalt, finished curbs and gutters, box culverts, sewers, underground water mains, sprinkler systems, sidewalks, concrete flatwork, and textured or decorative surfaces damaged during conduit and junction box installation.

B. Coordinate with local utilities for utility repair.

C. Notify the Engineer of all necessary repairs.

END OF SECTION